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THE BROOK STICKLEBACK

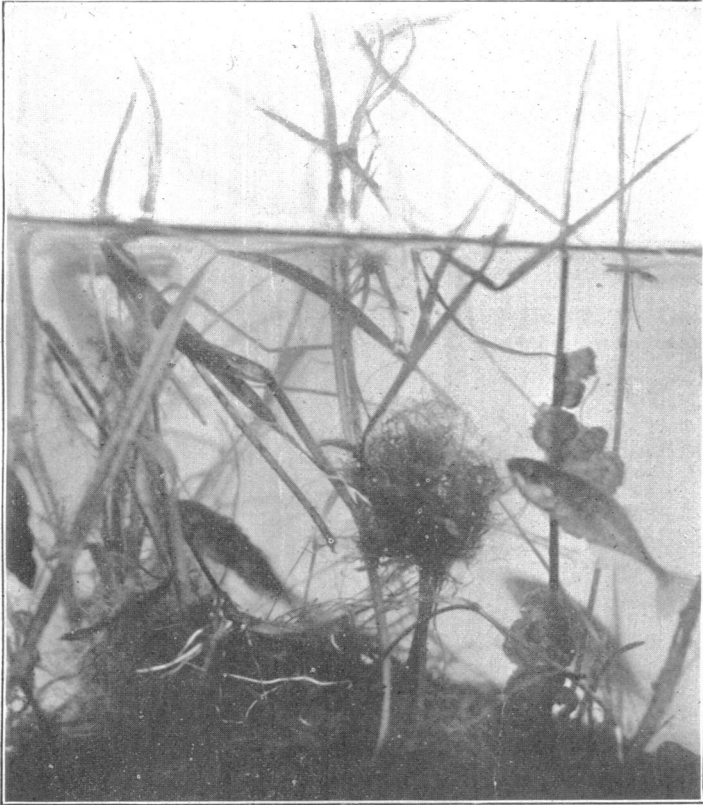
By Dr. E. EUGENE BARKER

NEW YORK STATE COLLEGE OF AGRICULTURE

IN some of our shallow, weed-choked pools and ditches there lives a most interesting little fish—the brook or five-spined stickleback (*Eucalia inconstans*), Kirtland. He is so well accustomed to living in stagnant water that he can easily be transferred to an aquarium where he thrives well and is sure to prove an interesting pet. He is diminutive in size—the largest adults measuring barely over one and one half inch in length. The males are bright in color, having a veiling of black over an olive-green ground color which lightens to yellow on the belly. The females are somewhat lighter in color. They are extremely pugnacious little fishes, and show resentment when another fish approaches, even one of their own kind. The spines on the back bristle up like hairs on a dog's back, and with a vicious lunge, the tiny bit of fury rushes, open-mouthed, at the innocent intruder. Often the fish's emotion is registered by a dark flush that sweeps over his body for the time being. It is interesting to note that, when these fishes are transferred to a light or a dark bottom, the color changes in accord with the background. They are voracious feeders and thrive on bits of angleworms, or of fresh meat if it is cut into fine enough pieces.

Like other members of the stickleback family, the brook stickleback is most interesting, perhaps, in his family habits. A true nest is built by the male in which the female deposits her eggs, and the male remains on guard to protect it until after the young have hatched. Some species nest readily in the aquarium, but the brook stickleback has not been observed to do so, at least as far as the writer's experience and knowledge go. On one occasion, however, a male fish was seen guarding his nest in a pond. He was captured and brought home and placed in an aquarium, together with his nest and its contents. As soon as all was settled he assumed again his proprietary air and stood guard over the little home and its precious contents. At one side of the nest there is almost always a small hole through which the eggs can be seen inside it. This fish often approached the opening, and if any of the

eggs protruded from it he took them into his mouth, and, backing away a short distance, blew them back again securely into the nest. He swam constantly around the nest, from time to time coming close to it and beating his pectoral fins rapidly like the wings of a hummingbird as it poises before a flower; he would thus draw a current of water through the nest and



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aerate the eggs. If any other fish were put into the aquarium, even a female of his own species, he would bristle, flush dark and dart viciously at the stranger and chase it away from the vicinity of his nest.

In the wild state, nesting is begun while the water is still at a low temperature, between 40 and 50 degrees Fahrenheit, although in the shallow surface water, at the margin of a pool where the nest is always built, the water may be as warm as 70 degrees. In central New York State nesting may begin before the middle of April. It continues until late in May. The nest

itself is a very dainty structure. It is always built of the materials at hand, which, of course, renders it inconspicuous, indeed, almost invisible amidst its surroundings.

The first nests are built before vegetation has begun to grow in the pools. The only suitable materials that the builder finds at hand are fine fibers, blades of dead grass and the like. These are loosely woven together and held in place by means of a thread which is produced by the male (as in other species of stickleback) from a secretion of the kidneys. It coagulates and hardens upon contact with the water, thus forming a thread suitable for binding together the materials of the nest. As the season advances and vegetation begins to appear in the pools, the nests are made mostly of green algæ, sometimes with sprouting seeds upon them. They are delicate little structures, spherical in shape, about three quarters of an inch in diameter, and with a small round hole on one side through which the eggs are placed within the nest. This little round ball of a home is tethered to a rootlet, submerged blade of grass or some similar attachment, and appears so much like a bit of the general mass of debris around it, or the masses of green algæ, that it can be discovered only with the greatest diligence.

The eggs are about 1 millimeter in diameter, transparent and light yellowish in color. They hatch in about eight or nine days when the water is as warm as 65 degrees. The young fishes are about 5 mm. long when they hatch. At first they still have a very large yolk-sac attached to them which contains enough nourishment to keep them for several days. It soon is all absorbed, however, and the tiny fishling grows fast. For the first few days he attaches himself to some still object by the tip end of his head—possibly by means of a viscid spot. The mouth is almost vertical, but soon becomes terminal. In two weeks time many sharp teeth make their appearance on the lower jaw. All this while the young fry is so transparent that all his inside affairs and private workings can be as easily observed as one can see a gardener at work inside his greenhouse. The primitive backbone with its developing rays, later to become ribs and spines, the heart pulsating at the rate of 108 beats to the minute, even the corpuscles of the blood flowing along the channels of the arteries, can be plainly seen. The eyes are the biggest and most conspicuous organs because of their dark color and take up about one third the size of the whole head. They are moved rapidly in the sockets together like the wheels of an automobile. Before the fishes hatch, there are a few black, star-shaped or moss-shaped chromatophores,

or color spots on the embryo. Later, small, orange-colored ones appear, and then yellow ones, so that by the time the fish is a week old he is almost golden in color and quite a pretty little fellow. From this time on, as soon as the yolk is all absorbed and the mouth parts are well developed, the little fellows swim about freely amongst the vegetation and find their own food in the minute forms of life with which all water vegetation and debris teems and we may assume that their voracity and their rapacity also grow apace.

Shallow pools that have clear water all the year through, even though they may be choked with vegetation and covered with floating plants during the summer, are likely to shelter these interesting little fishes. At least, such places are worth a careful search for the five-spined stickleback, and if one fails to find them one will be rewarded with a host of other interesting forms of life which abide here in a teeming world all their own.